

CLAIMS:

1. A control method for selecting cylinder and valve
actuation modes in an engine having at least a valve that
5 may be deactivated, the method comprising:
generating a set of available cylinder and
valve modes;
removing cylinder and valve modes from said
available set of cylinder and valve modes, based on a
10 group of operating conditions;
determining a cylinder and a valve mode, from
remaining active cylinder and valve modes, based on a
second group of operating conditions.
- 15 2. The method of Claim 1 wherein said plurality of
cylinder and valve modes is selected from a group of
cylinder modes comprising: V8, V4.
3. The method of Claim 1 wherein said plurality of
20 cylinder and valve modes is selected from a group of
cylinder modes comprising: V6, V2.
4. The method of Claim 1 wherein said plurality of
cylinder and valve modes are selected from a group of
25 cylinder modes comprising: I4, I2.
5. The method of Claim 1 wherein said plurality of
cylinder and valve modes are selected from a group of
cylinder modes comprising: I5, I3.

30

6. The method of Claim 1 wherein said plurality of valve modes are selected from a group of valve modes comprising: single intake/single exhaust, dual intake/dual exhaust.

5

7. The method of Claim 1 wherein said plurality of valve modes is selected from a group of valve modes comprising: single intake/dual exhaust, dual intake/single exhaust.

10

8. The method of Claim 1 wherein said plurality of valve modes is selected from a group of valve modes comprising: alternating intake/alternating exhaust, alternating intake/dual exhaust.

15

9. The method of Claim 6 wherein said plurality of valve modes is selected from a group of valve modes comprising: alternating intake/alternating exhaust.

20

10. The method of Claim 1 wherein said cylinder mode is determined by intake valve selection.

11. The method of Claim 1 wherein said first group of operating conditions comprises engine temperature.

25

12. The method of Claim 1 wherein said first group of operating conditions is comprises engine speed.

30

13. The method of Claim 1 wherein said first group of operating conditions is comprised of requested engine torque.

14. A control method for selecting cylinder and valve actuation modes in an engine having at least an electromechanical valve, the method comprising:

generating a set of available cylinder and valve modes;
organizing said set of available cylinder and valve modes based on available engine torque of said engine operating in said available cylinder and valve modes;

removing cylinder and valve modes from said set of cylinder and valve modes, based on a group of operating conditions, in order of said available engine torque;

determining a cylinder and a valve mode from remaining active cylinder and valve modes of said plurality of cylinder and valve modes, based on a second group of operating conditions; and

operating said engine in said determined cylinder and valve mode.

20

15. The method of Claim 14 wherein said organization of available cylinder and valve modes is in an order of higher to lower available engine torque.

25 16. The method of Claim 14 wherein said organization of available cylinder and valve modes is in an order of lower to higher available engine torque.

30 17. The method of Claim 14 wherein said plurality of cylinder and valve modes is selected from a group of cylinder modes comprising: V8, V4.

18. The method of Claim 14 wherein said plurality of valve modes is selected from a group of valve modes comprising: single intake/single exhaust, dual intake/dual exhaust.

5

19. The method of Claim 14 wherein said first group of operating conditions is comprises engine temperature.

20. The method of Claim 14 wherein said first group of operating conditions is comprises engine speed.

10

21. The method of Claim 14 wherein said first group of operating conditions is comprises requested engine torque.

15

22. A control method for selecting valve actuating modes in a multi-valve engine having at least an electromechanically actuated valve, the method comprising:

20

determining an operating condition of said electromechanically actuated valve; and

deactivating cylinder modes wherein electromechanically actuated valve operates when said operating condition indicates a condition of degraded performance of said electromechanical valve.

25

23. The method of Claim 22 wherein said operating condition is a temperature of said electromechanical valve actuator.

30

24. The method of Claim 22 wherein said operating condition is an amount of electrical current flowing through said electromechanical valve.

25. The method of Claim 22 wherein said operating condition is a voltage drop across said electromechanical valve.

5 26. The method of Claim 22 wherein said operating condition is a position of said electromechanical valve.

27. The method of Claim 22 wherein said operating condition is an impedance of said electromechanical
10 valve.

28. A control method for selecting valve actuating modes in a multi-valve engine having at least two intake valves that may be individually actuated, comprising:

15 a first mode of operation to actuate said intake valves simultaneously;

a second mode of operation to actuate said intake valves alternately;

a third mode of operation to actuate said
20 intake valves asynchronously; and

selecting among said first, second, and third modes of operation to provide a desired engine torque.

29. A control method for selecting valve actuating modes in a multi-valve engine having two intake and two exhaust valves that may be individually actuated, comprising:

5 a first mode of operation to actuate said intake valves simultaneously and to actuate the exhaust valves simultaneously;

a second mode of operation to actuate said intake valves simultaneously and to alternately actuate the exhaust valves;

10 a third mode of operation to alternately actuate said intake valves and to actuate the exhaust valves simultaneously;

a fourth mode of operation to alternately actuate said intake valves and to alternately actuate
15 said exhaust valves; and

selecting among said first, second, third, and forth modes of operation to provide a desired engine torque while reducing a different engine variable.

20 30. The method of Claim 29 wherein said reducing a different engine variable is reducing an amount of emissions of said engine.

31. The method of Claim 29 wherein said amount of
25 emissions of said engine are an amount of emitted hydrocarbons.

32. The method of Claim 29 wherein said amount of emissions of said engine are an amount of emitted oxides
30 of nitrogen.

33. The method of Claim 29 wherein said regulating a different engine variable is reducing an amount of fuel combusted by said engine.

34. A computer readable storage medium having stored data representing instructions executable by a computer to control an internal combustion engine of a vehicle, said storage medium comprising:

5 instructions for generating a set of available cylinder and valve modes;

 removing cylinder and valve modes from said set of cylinder and valve modes, based on a group of operating conditions; and

10 determining a cylinder and a valve mode, from remaining active cylinder and valve modes, based on a second group of operating conditions.

15